CHAPTER 1

INTRODUCTION

1.1 PROJECT MOTIVATION

The emergence of a robotic application will be the next hot field in this current new era (Gates, 2007). It shows by the emergence of many robotics products with autonomous concept for example autonomous vacuum robot (Ulrich et. al., 1997), museum tours guide robot (Burgard et. al., 1998) and etc. When dealing with hazardous job, it is better to replace human with robot that can perform a task without continuous human guidance or autonomous robot (Bekey, 2005) to overcome human risks.

Office window cleaning is a hazardous job and it involves high cost. Cases reported to Health and Safety Executive had shown that there had been between two to seven window cleaners were killed each year in Great Britain and 20-30 suffer major injuries while doing cleaning jobs (HSE, 2003). By using conventional method, human involvements are needed to the do all the task. This shows the need for small, lightweight and portable window cleaning robot for office window to replace human involvement in high risk activities.

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1.2 PROJECT BACKGROUND

Nowadays, cleaning an office window by using conventional methods is implemented widely. It is either via human involvement or by a machine. There are three types of conventional methods to clean office window. First method is by using workers suspended in the air. It can be done by using abseiling techniques or by gondola (Presto Property Services, Inc., 2008). Second method is by ground cleaning. In the ground cleaning, there are several ways that can be used. It can be done by reaching and washing technique (MPW Window Cleaners, 2008), using mobile elevated working platform (Salter Cleaning Services, 2008), using scaffold (Clear Magic Window Cleaning, 2008) or using a ladder (I Do Windows Inc., 2008). The third method is by using a customized window cleaning machines (SkyBot Ltd, 2006).

The advantage of conventional method by human is the job can be done for many complex office or building structure. The disadvantages of conventional methods by human can be described in four major points. First point is manual labour. Manual labours for conventional method undeniably gamble with high risk and long time consumption. The second point is limited efficiency. The process could be very slow as it depends on human expertise to finish the job. The third disadvantage is budget constraint. Using conventional method by human or by customized machine involves high cost for its equipment and suppliers, labours cost, insurance (Giamberardino, 2001), and by the machine itself. The last point is limiting factors. There are certain limiting factors with job done by human. If the job is done by human, it depends on weather and daylight factor. This project is hoped to overcome the limitation of conventional methods. The project is focusing in developing a small cleaning robot for office window.

1.3 PROJECT PROBLEM STATEMENT

Cleaning is routine in our life. It involves many activities in our daily life. It is a hard work job and a lot of time is consumed. Window cleaning is also one aspect of office maintenance activity. The clean windows will irrefutably provide a comfortable environment to the office inhabitants. The two main points that are stressed in this project are to overcome the hazard (HSE, 2008) of human involvement in cleaning office window activity and reduce high cost by the conventional method of cleaning window. It becomes necessary to overcome the limitation. The project intends to replace or minimize human involvement in cleaning the window by replacing it with a small cleaning robot for office window with several capabilities. The abilities are; portable, small size, lightweight, automatic operation and can clean all the corner of the office window.

1.4 PROJECT OBJECTIVES

The project is conducted to achieve the following objectives:-

a) To design a small cleaning robot for office window which is portable, small size, lightweight, automatic operation and can clean all the corners of the office window.
b) To write the software program of the cleaning robot.
c) To build the electrical part of the cleaning robot.
d) To build the mechanical part of the cleaning robot.
e) To assembly and testing the cleaning robot that can be operated on the office glass window.